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AMERICAN BATS OF THE SUBFAMILY  
EMBALLONURINAE

BY COLIN CAMPBELL SANBORN  
CURATOR OF MAMMALS

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The American forms of the subfamily Emballonurinae have had no revisionary treatment since the work of Peters in 1867 and Dobson's Catalogue of the Chiroptera in 1878. The genera were carefully revised by Miller in 1907.

These bats are distributed from northern Mexico to central Brazil on the mainland but are found only on Grenada Island in the West Indies. Six of the genera and most of the species are fairly abundant, but *Centronycteris* is poorly represented in collections and *Myropteryx* is known only from the type and one or two other specimens. Of the eight genera and eighteen forms represented in the subfamily, one genus and five forms have not been available. Of the remaining forms, 1245 specimens have been examined.

I wish to thank Mr. Gerrit S. Miller, Jr., of the United States National Museum for the loan of material which included large series from Mexico; Dr. H. E. Anthony of the American Museum of Natural History, for many specimens from South America, including series of the hitherto rare genera *Peronymus* and *Cormura*; and Dr. G. M. Allen, Museum of Comparative Zoology, Mr. J. K. Doult, Carnegie Museum, and Dr. L. R. Dice, University of Michigan Museum, for loan of valuable material under their care. Especial thanks are extended to Miss Jane St. Leger and Dr. T. S. C. Morrison-Scott for examining and sending notes and measurements on two types in the British Museum. The drawings are by Mr. John J. Janecek and the maps by Mr. H. Reed Waugh.

Under "Specimens examined," the figures refer to skins with skulls unless otherwise stated. The following abbreviations are used: F.M.=Field Museum of Natural History; A.M.=American Museum of Natural History; N.M.=U. S. National Museum;

M.C.Z.=Museum of Comparative Zoology; C.M.=Carnegie Museum; U.M.=University of Michigan Museum.

## KEY TO GENERA AND SPECIES BASED ON EXTERNAL CHARACTERS

## Wing sac absent

Wing attached to tibia; forearm haired . . . . . *Rhynchiscus*

Wing attached to metatarsus; forearm hairless . . . . *Centronycteris*

Eastern Brazil . . . . . *maximiliani maximiliani*

Central America and western South America

*maximiliani centralis*

## Wing sac present

Wing sac close to forearm near elbow

Wings from tibia . . . . . *Saccopteryx*

Two white lines on back

Color usually black; larger . . . . . *bilineata*

Color brown; smaller . . . . . *leptura*

Color grizzled; small . . . . . *canescens*

Wings from metatarsus . . . . . *gymnura*

Wing sac short, on upper edge of antebrachial membrane; wings from tibia

Wings black . . . . . *Peropteryx*

Larger; forearm 45-53.6 . . . . . *kappleri*

Smaller; forearm 38.3-48.2 . . . . . *macrotis*

Mainland of Central and South America *macrotis macrotis*

Trinidad . . . . . *macrotis trinitatis*

Grenada . . . . . *macrotis phaea*

Wings white beyond forearm . . . . . *Peronymus*

Venezuela and Brazil . . . . . *leucopterus leucopterus*

Peru . . . . . *leucopterus cyclops*

Wing sac long, from edge of antebrachial

membrane to near elbow; wings from metatarsus. *Cormura*

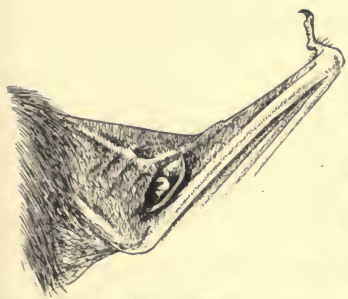
Probably like *Cormura* . . . . . *Myropteryx*

Wing sac in center of antebrachial membrane opening inward.

*Balantiopteryx*

White line on edge of wing membrane; larger . . . . . *plicata*

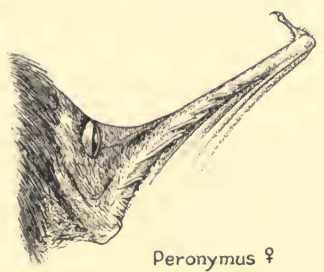
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Saccopteryx



Peropteryx



Peronymus ♀



Balantiopteryx



Cormura

FIG. 37. Wings of *Saccopteryx bilineata*, *Peropteryx kappleri*, *Peronymus leucopterus*, *Cormura brevisrostris*, and *Balantiopteryx plicata*, showing position and shape of wing sac.

No white line on edge of wing membrane; smaller

- Guatemala.....*io*  
Ecuador.....*infusca*

KEY TO GENERA AND SPECIES BASED ON CRANIAL CHARACTERS<sup>1</sup>

Anterior upper premolar flat and triangular.....*Rhynchiscus*

Anterior upper premolar round, with anterior and posterior cusps

Tooth row visible from above; basisphenoid pits deep, divided by plate; muzzle narrow.....*Centronycteris*

Basisphenoid pits extending to between pterygoids

*maximiliani maximiliani*

Basisphenoid pits not extending to between pterygoids

*maximiliani centralis*

Tooth row not visible from above; muzzle broad; no angle between rostrum and forehead

Molars with hypocones.....*Cormura*

Molars without hypocones (otherwise probably like *Cormura*)

*Myropteryx*

Anterior upper premolar a structureless spicule

Lateral pterygoid pits large.....*Peronymus*

Greatest length of skull 14.5-15.6.....*leucopterus leucopterus*

Greatest length of skull 16.2.....*leucopterus cyclops*

Lateral pterygoid pits small

Rostrum narrow, not expanded; basisphenoid pit usually divided by plate.....*Saccopteryx*

Upper tooth row c-m<sup>2</sup>

5.8-7.4.....*bilineata*

5.1-5.5.....*leptura*

4.6-5.....*canescens*

5.-(See external characters.).....*gymnura*

Rostrum expanded

Rostrum not inflated.....*Peropteryx*

Larger; greatest length of skull 16-17.8.....*kappleri*

Smaller; greatest length of skull 12-15.....*macrotis*

<sup>1</sup>The dental formula of all American Emballonurinae is the following:

$$\frac{-2-.1.-2-4567}{123.1.-2-4567} i \quad \frac{1-1}{3-3}, c \quad \frac{1-1}{1-1}, pm \quad \frac{2-2}{2-2}, m \quad \frac{3-3}{3-3} = 32.$$

## Mainland of Central and South America.

|                                                 |                            |
|-------------------------------------------------|----------------------------|
|                                                 | <i>macrotis macrotis</i>   |
| Trinidad . . . . .                              | <i>macrotis trinitatis</i> |
| Grenada . . . . .                               | <i>macrotis phaea</i>      |
| Rostrum inflated . . . . .                      | <i>Balantiopteryx</i>      |
| Interpterygoid fossa narrow . . . . .           | <i>plicata</i>             |
| Interpterygoid fossa broadly U-shaped . . . . . | <i>io</i>                  |
| Ecuador . . . . .                               | <i>infusca</i>             |

## Genus RHYNCHISCUS Miller

*Proboscidea* Spix, Simiarum et Vespertilionum Brasil, Spec. Novae, p. 61, 1823 (not *Proboscidea* J. G. Brugiere 1791). Type *Proboscidea saxatilis* Spix = *R. naso* Maximilian.

*Rhynchonycteris* Peters, Monatsber. Akad. Wiss. Berlin, p. 477, 1867 (not *Rhynchonycteris* Tschudi, 1844-1846). Type *Rhynchonycteris naso* Maximilian.

*Rhynchiscus* Miller, Proc. Biol. Soc. Wash., 20, p. 65, 1907—substitute for *Proboscidea* Spix, preoccupied.

*Characters*.—Size small; no wing sacs; forearm dotted with tufts of fur; interfemoral haired to exertion of tail; muzzle greatly elongated. Skull small; no angle between rostrum and forehead; premaxillaries broad posteriorly and ending on upper surface of rostrum; no division between deep basisphenoid pits. First upper premolar large, triangular, with small cingulum cusps anteriorly and posteriorly.

**Rhynchiscus naso** Maximilian.

*Vespertilio naso* Maximilian, Reise nach Brasiliens, 1, p. 251, footnote, 1820; Schinz, Thierreich, 1, p. 179, (1821); Beit. zur Naturgesch. Brasil., 2, p. 274, (1826).

*Rhynchonycteris naso* Peters, Monatsber. Akad. Wiss. Berlin, p. 478, 1867; Dobson, Proc. Zool. Soc. Lond., p. 880, 1878—Dutch Guiana; Dobson, Cat. Chiropt., p. 367, pl. 20, fig. 4, 1878 (desc., range, meas.); Alston, Biol. Cent.-Amer., p. 27, 1879-82 (range, habits); True, Proc. U. S. Nat. Mus., 11, p. 472, 1888—Honduras; J. A. Allen, Bull. Am. Mus. Nat. Hist., 9, p. 32, 1897—Costa Rica; Thomas, Ann. Mag. Nat. Hist., (7), 8, p. 140, 1901—British Guiana; *ibid*, p. 190—Brazil (Para); *ibid*, (9), 6, p. 270, 1920—Brazil (Rios Xingu and Negro); *ibid*, (10), 2, p. 257, 1928—Peru.

*Proboscidea naso* J. A. Allen, Bull. Am. Mus. Nat. Hist., 20, p. 343, 1904—Venezuela.

*Rhynchiscus naso* Miller, Proc. Biol. Soc. Wash., 20, p. 65, 1907; G. M. Allen, Bull. Mus. Comp. Zool., 52, p. 29, 1908—Brazil (Porto Seguro), (meas., milk teeth); J. A. Allen, Bull. Am. Mus. Nat. Hist., 24, p. 669, 1908—Nicaragua; *ibid*, 28, p. 110, 1910—Nicaragua; *ibid*, 30, p. 260, 1911—

Venezuela (habits); Thomas, Ann. Mag. Nat. Hist., (8), 9, p. 86, 1912—Brazil (near Para); Osgood, Field Mus. Nat. Hist., Zool. Ser., 10, p. 176, 1914—Peru; J. A. Allen, Bull. Am. Mus. Nat. Hist., 35, p. 224, 1916—Colombia; *ibid.*, p. 582, Brazil (Amazonas and Matto Grosso); Anthony, Zoologica, 3, p. 279, 1921—British Guiana; G. M. Allen, Bull. Mus. Comp. Zool., 65, p. 269, 1923—Panama.

*Rhynchincus* [sic] *naso* Beebe, Zoologica, 2, p. 218, 1919—British Guiana.

*Rhynchiscus naso priscus* G. M. Allen, Proc. Biol. Soc. Wash., 27, p. 109, 1914—Mexico (Xcopen, Quintana Roo); Goldman, Smiths. Misc. Coll., 69, p. 172, fig. 1, 1920—Panama; Goodwin, Bull. Am. Mus. Nat. Hist., 68, p. 7, 1934—Guatemala; Enders, Bull. Mus. Comp. Zool., 78, p. 415, 1935—Canal Zone (Barro Colorado Id.), (habits); Murie, Univ. Mich. Mus. Zool., Misc. Pub., No. 26, p. 17, 1935—British Honduras (habits, embryo).

*Proboscidea rivalis et saxatilis* Spix, Sim. et Vesp. Brasil., p. 62, 1823—Brazil (Amazon River and Rio San Francisco).

*Emballonura lineata* Temminck, Monogr. Mamm., 2, p. 297, 1835-41—Dutch Guiana.

*Proboscidea villosa* Gervais, Exped. Comte de Castelnau, Zool., Mamm., p. 68, pl. XI, fig. 1, pl. XIII, fig. 3 (teeth), 1855—Brazil (Prov. Goyaz).

*Type locality.*—Banks of Mucuri, near Morro d'Arara, Minas Geraes, Brazil.

*Distribution.*—From southern Mexico, south through Central America to northern Peru and central Brazil.

*Characters.*—Those of the genus.

*Color.*—The general color of the upper parts depends greatly on the amount of wear. In fresh pelage the gray tips of the hairs give a very light grizzled appearance. As these tips wear off, the brown bases become visible and the general color is much darker. On the lower back and rump are two curved lines in rough form of an hour glass, which in some worn specimens do not show. The hairs on the upper side of the interfemoral membrane, forearm and adjoining membrane are reddish brown and gray. On the under side, the bases of the hairs are dark brown and the tips light gray, giving a white, gray, or buffy appearance. The scattered hairs on the under side of the interfemoral membrane are gray.

The amount of wear and a slight individual difference in color explain finding both light and dark specimens in the same locality.

*Measurements.*—Forearm, males, 35.3-40.5 mm.; females, 35.8-40.7. Skull: greatest length 11.2-12.6; condylo-basal length 10-11.2; interorbital width 2.3-2.8; least width of rostrum 2.9-3.6; zygomatic width 6.7-7.3; mastoid width 6.3-6.8; width of brain-case

5.7–6.5; upper tooth row  $c-m^2$ , 4.3–4.7; width across canines 3.1–3.5; width across  $m^2-m^2$ , 4.2–4.7. 119 alcoholics, 73 skins and 38 skulls measured.

*Specimens examined.*—233. MEXICO: Xcopen, Quintana Roo, 3 (2 alc.) topotypes of *R. priscus* (M.C.Z.). BRITISH HONDURAS: Belize River, 7 (U.M.); Cayo, 12 (U.M.). GUATEMALA: Ocas, San Marcos, 6 alc. (A.M.). HONDURAS: San Pedro, 5 alc. (F.M.); Jaral, 1 alc. (N.M.); Segovia River, 1 (N.M.). EL SALVADOR: San Salvador,



FIG. 38. Known distribution of *Rhynchiscus naso*. ■ = specimens examined. □ = published references.

1 (N.M.). NICARAGUA: Pena Blanca, 10 (A.M.); Greytown, 5 (1 alc.), (N.M.); Tuma, 7 (A.M.); Prinzipolka River, 25 alc. (N.M.); Escondido, 21 alc. (N.M.). COSTA RICA: 10 (A.M.). PANAMA: Rio Jesusito, 6 alc. (M.C.Z.); Summit, 9 alc. (M.C.Z.); Carozal, 8 alc. (N.M.); Lagartera, 10 alc. (F.M.). COLOMBIA: Novita, Rio Juan, Cauca, 5 (A.M.); Caqueta, La Murelia, Rio Bodoquera, 8 (A.M.). ECUADOR: Montalvo, Rio Bobonazo, 1 (F.M.); Rios Pindo Yacu and Capihuari, 4 (F.M.). PERU: Lagunas, 1 alc. (F.M.); Nazareth, 8 alc. (F.M.). TRINIDAD: Caroni River, 7 alc. (M.C.Z.). VENEZUELA: Rio Yurman, 3 (A.M.); Maripa, 3 (A.M.); Mato River, 3 (A.M.); Quiribana de Caicara, 3 (N.M.); San Antonio, 11 alc.

(N.M.); Lagunillas, Zulia, 8 (7 alc.), (F.M.). BRAZIL: Porto Seguro, 9 alc. (M.C.Z.); Sao Marcello, Rio Preto, Bahia, 1 (F.M.); Faro, Rio Jamunda, 2 (F.M.); Upper Amazon, 1 (N.M.); Tauary, Rio Tapajoz, 2 (1 alc.) (M.C.Z.); Cucuhy, 1 alc. (N.M.); Porto Campo, Amazonas, 1 (A.M.); Calama, Matto Grosso, 9 (A.M.).

*Remarks.*—No marked differences were found in series from widely separated localities. Females average larger than males both in forearm and skull measurements.

*Rhynchiscus naso priscus* was separated by Dr. G. M. Allen mainly on the shape of the anterior upper premolar, but a careful examination of some eighty skulls shows great variation in this tooth irrespective of locality. In a series from any one locality, teeth may be found varying from an almost simple tooth with barely indicated cusps to a broad triangular tooth with prominent cusps.

### Genus SACCOPTERYX Illiger

*Saccopteryx* Illiger, Prodr. Syst. Mamm. et Avium, p. 121, 1811. Type *Vespertilio leptura* Schreber.

*Urocryptus* Temminck, Van der Hoeven's Tijdschr. Nat. Gesch. en Physiol., 5, p. 31, 1838-39. Type *Urocryptus bilineatus* Temminck.

*Characters.*—Large glandular sac situated close to forearm near elbow and opening on upper surface of antebrachial membrane. Wings from tarsus. Skull with slight angle between rostrum and forehead. Premaxillaries large, ending on upper surface of rostrum. Postorbital processes long and broad. Sagittal crest on brain-case. Basisphenoid pits large, usually separated by plate. First upper premolar (pm<sup>2</sup>) a small structureless spicule.

### *Saccopteryx bilineata* Temminck.

*Urocryptus bilineatus* Temminck, Van der Hoeven's Tijdschr. Nat. Gesch. en Physiol., 5, p. 33, 1838-39; Monogr. Mamm., 2, p. 301, pl. 61, figs. 3-4 (animal and head) 1835-41.

*Emballonura bilineata* Wagner, Suppl. Schreb. Säugeth., 5, p. 694, 1855.

*Saccopteryx bilineata* Peters, Monatsber. Akad. Wiss. Berlin, p. 471, 1867; Dobson, Cat. Chiropt., p. 372, 1878 (descr., meas., range); Alston, Biol. Cent.-Amer., p. 28, 1879-82 (range, habits); J. A. Allen and Chapman, Bull. Am. Mus. Nat. Hist., 5, p. 205, 1893—Trinidad; *ibid.*, p. 237, 1893—Costa Rica; Thomas, Proc. Zool. Soc. Lond., p. 334, 1893—Peru; Thomas, Journ. Trinidad Field Nat. Club, 1, No. 7, p. 4 (author's separate), 1893—Trinidad; J. A. Allen and Chapman, Bull. Am. Mus. Nat. Hist., 9, p. 14, 1897—Trinidad; Bangs, Proc. N. Eng. Zool. Club, 1, p. 101, 1900—Colombia (descr.); Thomas, Ann. Mag. Nat. Hist., (7), 8, p. 190, 1901—Brazil (Para); *ibid.*, p. 140—British Guiana; J. A. Allen, Bull. Am. Mus. Nat. Hist., 20, p. 457, 1904—Colombia; *ibid.*, p. 343—Venezuela; *ibid.*, 30, p. 260, 1911



—Venezuela (habits); Thomas, Ann. Mag. Nat. Hist., (8), 9, p. 86, 1912  
 —Brazil (Amazonas); Anthony, Bull. Am. Mus. Nat. Hist., 35, p. 373, 1916—Panama; J. A. Allen, Bull. Am. Mus. Nat. Hist., 35, p. 582, 1916  
 —Brazil (Matto Grosso); *ibid*, p. 123—Ecuador; Beebe, Zoologica, 2, p. 218, 1919—British Guiana; Goldman, Smiths. Misc. Coll., 69, p. 173, fig. 2, 1920—Panama; Anthony, Zoologica, 3, p. 279, 1921—British Guiana; G. M. Allen, Bull. Mus. Comp. Zool., 65, p. 270, 1923—Panama (habits); Thomas, Ann. Mag. Nat. Hist., (9), 6, p. 270, 1920—Brazil (Amazonas); *ibid*, (10), 2, p. 257, 1928—Peru; Enders, Journ. Mamm., 11, p. 290, 1930—Canal Zone (habits); Sanborn, Field Mus. Nat. Hist.,



FIG. 39. Known distribution of *Saccopteryx bilineata*. Numerals and ■ = specimens examined. □ = published references.

Zool. Ser., 18, p. 8, 1931—Canal Zone; Sanborn, Ann. Carnegie Mus., 21, p. 172, 1932—Colombia, Brazil (Amazonas); Enders, Bull. Mus. Comp. Zool., 78, p. 415, 1935—Canal Zone (habits).

*Saccopteryx insignis* Wagner, Suppl. Schreb. Säugeth., p. 695, 1855—Rio de Janeiro; Pelzeln, Verh. Zool.-Bot. Ges. Wien, Beiheft, p. 39, 1883.

*Saccopteryx perspicillifer* Miller, Bull. Am. Mus. Nat. Hist., 12, p. 176, 1899—Trinidad (Caura).

*Saccopteryx bilineata centralis* Thomas, Ann. Mag. Nat. Hist., (7), 13, p. 251, 1904—Mexico (Teapa, Tabasco); J. A. Allen, Bull. Am. Mus. Nat. Hist., 28, p. 110, 1910—Nicaragua; Goodwin, Bull. Am. Mus. Nat. Hist., 68, p. 7, 1934—Guatemala (desc., meas., habits); Murie, Univ. Mich. Mus. Zool., Misc. Pub. No. 26, p. 18, 1935—Guatemala (habits).

*Type locality.*—Dutch Guiana.

*Distribution.*—From southern Mexico (Colima, Guerrero, and Vera Cruz) south to central Bolivia and Matto Grosso and Rio de Janeiro, Brazil.

*Characters.*—Size large. Wings from tarsus. Wing sac very well developed in males; less so in females. Interfemoral thinly haired to exertion of tail.

*Color.*—Upper parts black in fresh pelage, with two longitudinal wavy lines of a whitish or buffy color, from upper back to rump. In worn pelage the general color becomes more brownish. Hairs, with the exception of white-tipped ones forming the dorsal lines, uniform to bases. Hairs of under parts dark at bases with light tips giving a brownish or grayish appearance.

#### MEASUREMENTS

|                   | Sex | No. | Forearm   | No. | Condyl-<br>basal length | No. | Upper tooth<br>row |
|-------------------|-----|-----|-----------|-----|-------------------------|-----|--------------------|
| Mexico.....       | ♂♂  | 24  | 41.7-45.6 | 4   | 13.2-14                 | 3   | 6.1-6.4            |
|                   | ♀♀  | 45  | 43.7-47.5 | 9   | 13.5-14                 | 11  | 6. -6.4            |
| Guatemala.....    | ♂♂  | 5   | 42.1-45.7 | 1   | 13.7                    | 3   | 6.2-6.4            |
|                   | ♀♀  | 14  | 43.7-46   | 9   | 13.6-14.1               | 10  | 6.1-6.4            |
| British Honduras  | ♂♂  | 2   | 43. -44.7 | 2   | 13.5-13.8               | 2   | 6.2-6.3            |
|                   | ♀♀  | 1   | 43.7      | 1   | 13.6                    | 1   | 6.3                |
| Nicaragua.....    | ♂♂  | 2   | 42.8-44   |     |                         |     |                    |
|                   | ♀♀  | 2   | 44.3-46.9 | 2   | 14.1-14.5               | 2   | 6.5-6.9            |
| Costa Rica.....   | ♂♂  | 6   | 43. -46.4 | 4   | 14.1-14.4               | 4   | 6.5-6.7            |
|                   | ♀♀  | 8   | 45. -49.1 | 2   | 14.6-14.6               | 2   | 6.8-6.8            |
| Panama.....       | ♂♂  | 22  | 43.2-47.6 | 2   | 14.6-14.6               | 2   | 6.8-6.8            |
|                   | ♀♀  | 42  | 44. -50.8 | 6   | 14.3-14.9               | 6   | 6.6-7.2            |
| Colombia.....     | ♂♂  | 4   | 44.1-44.9 | 2   | 14.1-15.1               | 2   | 6.6-6.6            |
|                   | ♀♀  | 15  | 44.3-48   | 9   | 13.6-14.5               | 10  | 6.5-6.9            |
| Ecuador, West...  | ♂♂  | 1   | 44.4      | 1   | 14.5                    | 1   | 6.7                |
|                   | ♀♀  | 1   | 46.       | 1   | 14.3                    | 1   | 6.7                |
| Venezuela, West.  | ♂♂  | 3   | 44. -46.5 |     |                         |     |                    |
|                   | ♀♀  | 3   | 44.4-47.6 | 2   | 14.4-14.4               | 2   | 6.7-6.8            |
| Venezuela, East.. | ♂♂  |     |           |     |                         |     |                    |
|                   | ♀♀  | 5   | 44.6-49.6 | 6   | 14.7-15.7               | 6   | 7. -7.4            |
| Ecuador, East...  | ♂♂  | 2   | 45.6-47.  | 3   | 15.2-15.4               | 3   | 7.4                |
|                   | ♀♀  | 6   | 46.7-49.6 | 7   | 14.6-15.4               | 7   | 7.2-7.4            |
| Trinidad.....     | ♂♂  | 3   | 46.6-47.6 | 1   | 15.5                    | 1   | 7.3                |
|                   | ♀♀  | 4   | 45.2-50.2 | 4   | 14.9-15.5               | 4   | 7.1-7.3            |
| British Guiana... | ♂♂  | 1   | 47.5      |     |                         |     |                    |
|                   | ♀♀  | 3   | 46.5-49.1 |     |                         |     |                    |
| Brazil            |     |     |           |     |                         |     |                    |
| Amazonas....      | ♂♂  | 7   | 44.6-48.6 | 3   | 15. -15.1               | 2   | 7. -7.             |
|                   | ♀♀  | 16  | 47.6-51.7 | 6   | 15.1-15.5               | 10  | 7. -7.3            |
| Piauhy.....       | ♂♂  | 1   | 44.2      | 1   | 14.6                    | 1   | 6.8                |
| Maranhão.....     | ♂♂  | 2   | 46.2-46.4 | 2   | 14.7-14.9               | 2   | 6.9-7.             |
| Rio de Janeiro.   | ♀♀  | 1   | 44.       | 1   | 13.2                    | 1   | 5.8                |
| Bolivia.....      | ♀♀  | 1   | 50.5      | 1   | 15.5                    | 1   | 7.2                |

*Specimens examined*—314. MEXICO: Vera Cruz, 7 (6 alc.); (N.M.); Achotal, Vera Cruz, 5 skins, 12 skulls, 38 alc. (F.M.), Minatitlan, Vera Cruz, 3 alc. (N.M.); Hacienda Magdalena, Colima,

3 alc. (N.M.); Acapulco, Guerrero, 7 alc. (N.M.); Papayo, Guerrero, 8 alc. (N.M.); Lano Grande, Oaxaca, 6 alc. (N.M.); Santo Domingo, Oaxaca, 3 alc. (N.M.); Tepanatepec, Oaxaca, 3 (M.C.Z.). GUATEMALA: Bobos, Izabal, 1 (F.M.); Hacienda California, San Marcos, 10 alc. (A.M.); Moca, Solola, 1 (F.M.); Uxactum, Peten, 11 (U.M.). BRITISH HONDURAS: Cayo District, 2 (M.C.Z.). HONDURAS: Lancetilla, 1 (M.C.Z.). NICARAGUA: Prinzapolka River, 4 alc. (skulls cleaned); Greytown, 1 alc. (skull cleaned); Escondido, 1 alc. (all N.M.). COSTA RICA: San Carlos, 4 (F.M.); Los Huecos, Guanacaste 3 (U.M.); north of Liberia 7 (M.C.Z.). PANAMA: Ancon, 2 alc. (M.C.Z.); Cana, 1 alc. (N.M.); Barro Colorado Island, 5 (2 F.M., 3 U.M.), 7 alc. (2 F.M., 1 M.C.Z., 4 A.M.); Culebra, 1 alc. (M.C.Z.); La Chorrera, 9 alc. (M.C.Z.); Summit, 3 alc. (M.C.Z.); Las Cascades, 2 alc. (M.C.Z.); Cerro Azul, 1 alc. (N.M.); Ft. Lorenzo, 1 alc. (N.M.); Gatun, 8 alc. (N.M.); Mt. Sapo, 4 alc. (M.C.Z.); Old Panama, 1 (F.M.), 3 alc. (M.C.Z.); Orchid Island, 1 alc. (N.M.); Rio del Puente, 5 alc. (N.M.); Tabernilla, 1 alc. (N.M.); Taboga Island, 9 alc. (N.M.); Balboa, 6 (3 alc.) (F.M.). COLOMBIA: 1 (N.M.); Bonda, 26 (9 alc.) (A.M.); Santa Marta, 2 alc. (A.M.); Minca, 2 (A.M.). VENEZUELA: Cassiquiare Canal, 2 alc. (N.M.); Caicara, 2 (N.M.); Cristobal Colon, Paria Peninsula, 1 (A.M.); Peru Mine, El Callo, 2 (A.M.); Rio Cogollo, Perija, 6 (4 alc.) (F.M.). TRINIDAD: Caura, 2 alc. inc. type of *perspillifer* (A.M.); Princetown, 2 alc. (skulls cleaned) (A.M.); Port of Spain, 4 (2 alc., 1 skel., N.M.; 1 alc., A.M.). BRITISH GUIANA: Essequibo River, 1 alc. (N.M.); Kalacoon, 3 alc. (A.M.). ECUADOR: Rio Pindo Yacu, 10 (F.M.); Cachavi, 3 (N.M.). BRAZIL: Lago Janary, Livramento 8 (4 alc.), (M.C.Z.); Boca do Igarape Piaba, 4 (M.C.Z.); Cameta, Rio Tocantins, 2 (M.C.Z.); Cameta, Baron Melgaco, 1 (A.M.); Utin, near Santarem, 1 (F.M.); Santarem, 7 alc. (C.M.); Maranhão, 2 alc. (N.M.); Barro do Corda, 2 (F.M.); Deserto, Piauhy, 2 (F.M.); Rio de Janeiro, 1 alc. (M.C.Z.). BOLIVIA: Rio Palometillas, 2 (F.M.).

*Remarks.*—The species *bilineata* has a very wide range from southern Mexico to Bolivia and eastern Brazil, with but slight geographic variation in size. Specimens from Mexico, Guatemala, and British Honduras have on the average smaller forearms and skulls. The size increases southward to Trinidad and the Amazon drainage, where the maximum for the species is reached. In the area between the two extremes the size is variable, while in eastern Brazil specimens are no larger than ones from Mexico. When the extremes are compared, as Thomas did when he described *centralis*, the

difference in size is very marked, but at no point can a definite line be drawn between large and small specimens. As there is no other character besides size, it seems best to consider all specimens as belonging to but one species, *bilineata*.

### *Saccopteryx leptura* Schreber.

*Vespertilio leptura* Schreber, Säugeth., 1, pl. 57, 1774.

*Saccopteryx leptura* Illiger, Prodr. Syst. Mamm. et Avium, p. 121, 1811; Gray, Ann. Mag. Nat. Hist., (1), 16, p. 279, 1845; Krauss, Archiv. f. Naturg. p. 178, 1846; Tomes, Proc. Zool. Soc. Lond., p. 547, 1858—Ecuador; Peters, Monatsber. Akad. Wiss. Berlin, p. 471, 1867; Dobson, Cat. Chiropt., p. 271, 1878 (pt.); H. Allen, Proc. Acad. Nat. Sci. Phila., p. 321, 1889 (wings); Thomas, Proc. Zool. Soc. Lond. p. 334, 1893—Peru; Jentink, Notes Leyden Mus., 15, p. 280, 1893—British Guiana; J. A. Allen and Chapman, Bull. Am. Mus. Nat. Hist., 5, pp. 205 and 232, 1893—Trinidad; *ibid.*, 9, p. 14, 1897—Trinidad; Bangs, Proc. N. Eng. Zool. Club, 1, p. 101, 1900—Colombia; J. A. Allen, Bull. Am. Mus. Nat. Hist., 13, p. 94, 1900—Colombia; Thomas, Ann. Mag. Nat. Hist., (7), 8, p. 140, 1901—British Guiana; Lyon & Robinson, Proc. U. S. Nat. Mus., 24, p. 160, 1901—Venezuela (descr., skin meas.); J. A. Allen, Bull. Am. Mus. Nat. Hist., 20, p. 457, 1904 (pt.)—Colombia; *ibid.*, 30, p. 260, 1911—Venezuela; Thomas, Ann. Mag. Nat. Hist., (8), 9, p. 86, 1912—Brazil (Para); Osgood, Field Mus. Nat. Hist., Zool. Ser., 10, p. 64, 1912 (pt.)—Venezuela; Cabrera, Trab. Mus. Nac. Cien. Nat., No. 11, p. 36, 1912; *ibid.*, No. 31, p. 11, 1917; Beebe, Zoologica, 2, p. 218, 1919—British Guiana; Goldman, Smiths. Misc. Coll., 59, p. 175, 1920—Panama; Thomas, Ann. Mag. Nat. Hist., (9), 6, p. 270, 1920; Brazil (Rios Negro and Tapajoz); *ibid.*, (10), 2, p. 287, 1928—Peru.

*Saccopteryx bilineata* Osgood (not Temminck), Field Mus. Nat. Hist., Zool. Ser., 10, p. 214, 1916—Porto Velho, Brazil.

*Type locality*.—Dutch Guiana.

*Distribution*.—From Panama south to southwestern Peru and northeastern Brazil.

*Characters*.—Like *S. bilineata* but smaller, especially the skull, and of a different color.

*Color*.—Upper parts uniform brown marked by two longitudinal whitish lines extending from upper back to rump. In some specimens these lines are indistinct. Brown below, but usually a little lighter than above.

*Measurements*.—Forearm, males, 37.4–40, females, 39.1–42.3. Skull: greatest length from front of canine 13.1–14.4; condylo-basal length 11.8–12.7; interorbital width 3.2–3.8; intertemporal width 2.1–2.5; zygomatic width 8.4–9.1; mastoid width 7–7.5; upper tooth row  $c-m^2$ , 5.1–5.5; width across canines 2.9–3.4; width across  $m^2-m^3$ , 5.9–6.3.

*Specimens examined*.—36. PANAMA: Barro Colorado Id., C. Z., 1 (U.M.); Fort Randolph, C. Z., 1 alc. (M.C.Z.).—COLOMBIA: Santa Marta Mts., 1 (M.C.Z.); Bonda, 3 juv. alc. (A.M.).—ECUADOR: Rio Pindo Yacu, Oriente, 1 (F.M.).—TRINIDAD: 17 alc., 5 skulls cleaned (12 A.M., 5 N.M.).—VENEZUELA: Rio Aurare, Zulia, 1 (F.M.); San Julian, 3 (N.M.); Peru Mine, El Callao, 1 (A.M.).—BRAZIL: Boca de Igarape Piaba, Rio Amazonas, 2 (M.C.Z.); Pernambuco, 1 alc. (M.C.Z.); Porto Velho, Amazonas, 3 alc. skulls cleaned (F.M.).—PERU: Bellavista, 1 alc. (M.C.Z.).



FIG. 40. Known distribution of ■ *Saccopteryx leptura* and ○ *S. gymnura*. ■ = specimens examined. □ ○ = published references.

*Remarks*.—Some large specimens of *leptura* often closely resemble small, worn specimens of *bilineata*, but the forearm and upper tooth row are always shorter in *leptura*.

*Saccopteryx bilineata*, *S. leptura*, and *S. canescens* all have about the same range. *S. bilineata* has the widest distribution, going north to southern Mexico and south to Rio de Janeiro. *Saccopteryx leptura* and *S. canescens* have about an equal range, but *leptura* extends farther north, to Panama, and farther east, to Pernambuco, Brazil. With three species in the same territory great care should be used in making identifications, especially of alcoholic material. Poorly

made skins with broken forearms and broken skulls are sometimes very difficult to identify.

**Saccopteryx canescens** Thomas.

*Saccopteryx canescens* Thomas, Ann. Mag. Nat. Hist., (7), 7, p. 366, 1901—Venezuela; Surinam; *ibid*, (9), 6, p. 270, 1920—Brazil (near Santarem).

*Saccopteryx leptura* J. A. Allen (not Schreber), Bull. Am. Mus. Nat. Hist., 13, p. 94, 1900 (pt.); *ibid*, 20, p. 457, 1904—Colombia; Osgood, Field Mus. Nat. Hist., Zool. Ser., 10, p. 64, 1912 (pt.)—Venezuela; Sanborn, Ann. Carnegie Mus., 21, p. 172, 1932—Colombia.

*Saccopteryx pumila* Thomas, Ann. Mag. Nat. Hist., (8), 14, p. 410, 1914—Venezuela (Altagracia, Lower Orinoco).

*Type locality*.—Obidos, Para, Brazil.

*Type*.—In British Museum, No. 99. 11. 2. 2. "Apparently female." Collected May 21, 1898 by J. Trumbull, Esq.

*Distribution*.—From northern Colombia south through central Peru and east to French Guiana and the Amazon basin.

*Characters*.—Like *S. leptura* but averaging smaller; tooth row shorter and molars narrower.

*Color*.—Upper parts grayish or brownish, but always with a grizzled appearance. Longitudinal lines much less distinct than in *leptura*. Under parts usually much lighter than back, gray or buffy and never so dark as in *leptura*.

*Measurements*.—Forearm 35.8–40.8 (4 males 35.9–37.5, 4 females 36.5–39.4, 8 no sex 35.8–40.8). Skull: greatest length from front of incisors 12.3–13.3; condylo-basal length 10.9–11.7; interorbital width 2.9–3.2; intertemporal width 1.9–2.3; zygomatic width 7.8–8.5; mastoid width 6.5–7.1; upper tooth row c-m<sup>2</sup>, 4.6–5; width across canines 2.6–3; width across m<sup>2</sup>-m<sup>2</sup>, 5.1–5.6.

*Specimens examined*.—20. COLOMBIA: Dibulla, Fundacion, and Mamatoco, Santa Marta Region, 3 (C.M.); Natagaima, 4 (M.C.Z.); Bonda, 3 (A.M.)—VENEZUELA: Caicara, 1 (N.M.); Rio Aurare, Zulia, 2 (F.M.)—FRENCH GUIANA: Cayenne, 1 (F.M.). BRAZIL: Santarem, Rio Tapajoz, 1 (M.C.Z.); Boca de Igarape Piaba, Rio Amazonas, 1 (M.C.Z.); Amazon River, 1 (N.M.); Marajo Id., 1 alc., skull cleaned (N.M.). PERU: Puerto Victoria, Rio Pachitea, 1 (F.M.).

*Remarks*.—The shorter tooth row and the narrower molars are the best characters for distinguishing this form from *S. leptura*. The largest skulls of *canescens* are about equal in size to the smallest of *leptura*, but those of *canescens* are of a lighter build. The color will usually separate the species, but in some specimens of *canescens* the

grizzled back is not always clear and the under parts are dark. Well preserved specimens of *canescens* in alcohol have not been examined, but there may be some difference in the ear, as Thomas stated in his description.

*Saccopteryx pumila* Thomas was said to be about the size of *canescens* but with larger molars and the basisphenoid pit without a median septum. Of the twelve skulls of *canescens* examined, four (3 Venezuela, 1 Colombia) are without the median septum, and one



FIG. 41. Known distribution of *Saccopteryx canescens*. ■ = specimens examined. □ = published references.

(Brazil) has it extended but halfway down the pit. The median septum may have been lost in cleaning, but it does not appear so.

Miss Jane St. Leger has been kind enough to send some measurements of three specimens of *Saccopteryx pumila*, the type, a female from Isle le Pere, French Guiana, and a female from El Trompilla, Carabobo, Venezuela. These show the greatest length of the skull to be from 12.5–13.2 and the upper tooth row from 4.7 to 5, agreeing with the measurements of *canescens*. Miss St. Leger says: "The molars of the Type of *canescens* appear smaller to the eye than they actually are, due to the yellowish colouring of the skull and teeth."

**Saccopteryx gymnura** Thomas.

*Saccopteryx gymnura* Thomas, Ann. Mag. Nat. Hist., (7), 7, p. 367, 1901.

*Type locality*.—Santarem, Para, Brazil.

*Type*.—In British Museum, no. 75. 10. 22. 2. Female. Collected by Mr. Wickham. Specimen *c* under *S. leptura* of Dobson's Catalogue.

*Distribution*.—Known from one specimen from the type locality.

*Characters*.—Wing sac as in *Saccopteryx* and size as in *S. canescens*. Wings attached to metatarsus. Skull as in *canescens*.

*Color*.—"So far as could be told from an old specimen in alcohol, dark throughout. Fur gone from center of back."

*Measurements*.—"Forearm 35. Head and body 37; tail 14.5; ear 13; tragus (on inner edge) 2.5; tibia 13; hind foot, s. u. 4, c. u. 4.5; calcar 11. Skull: extreme length 12.7; basal length 10.4; zygomatic breadth 8; interorbital breadth 3.3; tip to tip of postorbital processes 5.9; intertemporal breadth 1.7; breadth of brain-case 6.1; length of upper molars 2.7; front of lower canine to back of  $m^3$ , 5."

*Specimens examined*.—None.

*Remarks*.—The attachment of the wing membrane to the metatarsus suggests a relationship between this form and *Saccopteryx* very much like the relationship of *Cormura* and *Peropteryx*. Dr. T. S. C. Morrison-Scott kindly examined the type in the British Museum and writes that the first premolar is a plain spicule and that the wing attaches halfway down the metatarsals.

Genus **CENTRONYCTERIS** Gray

*Centronycteris* Gray, Mag. Zool. Bot., 2, p. 499, 1838 (subgenus of *Proboscidea*).

*Type* *Vespertilio calcarata* Maximilian=*Vespertilio maximiliani* Fischer.

*Centronycteris* Peters, Monatsber. Akad. Wiss. Berlin, p. 478, 1867 (genus).

*Centronycteris* Dobson, Cat. Chiropt., p. 371, 1878 (subgenus of *Saccopteryx*).

*Characters*.—Skull without angle between rostrum and forehead. Lower edge of orbit expanded so little that edge of tooth row can be seen from above. First upper premolar ( $pm^2$ ) with distinct anterior and posterior cusps. Basisphenoid divided by a plate. Wings from metatarsus. No wing sac so far as known. Fur very long and soft. Back without lines.

**Centronycteris maximiliani maximiliani** Fischer.

*Vespertilio calcaratus* Maximilian, Schinz, Thierreich, 1, p. 180, 1821; Maximilian, Abbild. Naturg. Bras., Taf., 1822; Maximilian, Beitr. Naturg. Brasil, 2, p. 269, 1826.



*Vespertilio maximiliani* Fischer, Synopsis Mamm., 1, pp. 112–113, 1829—new name for *V. calcaratus* Maximilian, 1821, which is preoccupied by *V. calcaratus* Rafinesque, 1818.

*Centronycteris calcarata* Gray, Mag. Zool. Bot., 2, p. 499, 1838; Gervais, Exped. Comte de Castelnau, Mamm., p. 69, 1855; Peters, Monatsber. Akad. Wiss. Berlin, p. 478, 1867—(description of type specimen); Trouessart, Cat. Mamm., 1, p. 138, 1897.

*Saccopteryx calcarata* Dobson, Cat. Chiropt., p. 376, 1878.

*Saccopteryx wiedi* Palmer, Proc. Biol. Soc., Wash., 12, p. 110, 1898—new name for *V. calcaratus* Maximilian, 1821; antedated by *V. maximiliani* Fischer, 1829.

*Centronycteris wiedi* Trouessart, Cat. Mamm., Suppl., p. 98, 1904.

*C. [centronycteris] maximiliani* Thomas, Ann. Mag. Nat. Hist., (8), 10, p. 638, 1912.

*Centronycteris maximiliani* Thomas, Ann. Mag. Nat. Hist., (8), 11, p. 133, 1913—Brazil (Utinga, near Para).

*Type locality*.—Espírito Santo, Brazil.

*Distribution*.—Eastern Brazil.

*Characters*.—Basisphenoid pits extending forward between pterygoids.

*Color*.—Somewhat paler than tawny brown. (Thomas).

*Measurements*.—Female type (after Peters): forearm 44.5; third finger metacarpal 45. Thomas, length of basisphenoid pits 2.8.

*Specimens examined*.—None.

### *Centronycteris maximiliani centralis* Thomas.

*Centronycteris centralis* Thomas, Ann. Mag. Nat. Hist., (8), 10, p. 638, 1912; G. M. Allen, Bull. Mus. Comp. Zool., 65, p. 270, 1923.—Costa Rica.

*Centronycteris maximiliani centralis* Sanborn, Field Mus. Nat. Hist., Zool. Ser., 20, p. 94, 1936.—Guatemala.

*Type locality*.—Bogava, Chiriqui, Panama.

*Type*.—In British Museum, No. 0. 7. 11. 3.

*Distribution*.—Guatemala south to Ecuador and western Brazil.

*Characters*.—Like *maximiliani* but with much shorter basisphenoid pits which do not extend forward between the pterygoids.

*Color*.—Close to raw umber above, lighter below. Hairs on interfemoral membrane reddish. A specimen from Brazil is much lighter, being between buffy brown and olive brown. The fur in front of the eyes has a reddish tinge.

*Measurements*.—One male from Guatemala and one female from Costa Rica followed by measurements of the male type in parentheses: forearm 45.4–43 (45); third finger metacarpal 49.6–46.7 (46.5).

Skull: greatest length 15.5–15.5 (15); condylo-basal length 14.2–14.3; interorbital width 3.2–3.4; rostral width 6.7–6.4; zygomatic width 9.3–9.6 (10); mastoid width 7.7–7.8; width of brain-case 7.1–7.2; upper tooth row 6.1–6.4 (6.1); width across canines 3.7–3.7; width across  $m^2$ – $m^2$ , 7.1–7.3 (6.6).

Two females from Ecuador and one male from near Teffé, Brazil: forearm 47.1, 47.7, —; third finger metacarpal 49.1, 53.5, 45.6. Skull: greatest length 16.2—16.5; 15.2; condylo-basal length—, 15.4, 14; interorbital width 3.5, 3.3, 3.4; rostral width 6.4, 7, 6.6;



FIG. 42. Known distribution of  $\square$  *Centronycteris maximiliani maximiliani* and  $\bullet$  *C. m. centralis*.  $\bullet$ —specimens examined.  $\square$   $\circ$ —published references.

zygomatic width 9.6, 10.1, —; mastoid width—, 8, 8.1; width of brain-case 7.1, 7.3, 7.3; upper tooth row 6.9, 6.8, 6; width across canines 3.9, 4.1, —; width across  $m^2$ – $m^2$ , 7.5 7.5—.

External measurements of female from Ecuador: forearm 47.1; tibia 20.4; calcar 18.5; second digit metacarpal 46.4; third digit metacarpal 49.1, first phalanx 19.8, second phalanx 22.5; fourth digit metacarpal 39.8, first phalanx 11.6, second phalanx 10.7; fifth digit metacarpal 39, first phalanx 11, second phalanx 8.8.

*Specimens examined*.—5. GUATEMALA: Escobas, near San Tomas, Izabal, 1 male (F.M.). COSTA RICA: Viragua, 1 female

(M.C.Z.). ECUADOR: Montalvo, Rio Bobonazo, 1 female (F.M.); Mera, Rio Alpayuca, 1 female alc. (A.M.). BRAZIL: Sitio Isidoro, near Teffé, 1 male (A.M.).

*Remarks.*—In his original description Thomas said of *Centronycteris centralis* "Mainly distinguishable from *C. maximiliani* by its very different basisphenoid pits." None of the specimens examined seem to agree with Thomas' characterization of the typical form, so all are referred to *centralis*. It will be noticed that the specimens from Ecuador are larger than those from Central America and Brazil.

The specimen from Ecuador was taken from a hole in a tree, and the Guatamalan specimen was shot on the wing.

### Genus PEROPTERYX Peters

*Peropteryx* Peters, Monatsber. Akad. Wiss. Berlin, p. 472, 1867. Type *Vespertilio caninus* Maximilian=*Emballonura macrotis* Wagner.

*Characters.*—Skull with a very sharp angle between the expanded rostrum and brain-case. Basisphenoid pit not divided. Wing sac near upper edge of antebrachial membrane and opening outward.

#### *Peropteryx macrotis macrotis* Wagner.

*Emballonura macrotis* Wagner, Archiv. f. Naturg., 9, p. 367, 1843; Wagner, Abhandl. Münch. Akad., 5, p. 189, pl. 4, figs. 8–10, 1847; Peters, Monatsber. Akad. Wiss. Berlin, p. 472, 1867.

*Peropteryx macrotis macrotis* G. M. Allen, Journ. Mamm., 16, p. 227, 1935 (ref. to name only).

*Vespertilio caninus* "Maximilian," Schinz's Thierreich, 1, p. 179, 1821; Beitr. Naturg. Brasil, 2, p. 262, 1826—preoccupied by *Vespertilio caninus* Blumebach, 1797.

*Emballonura canina* Temminck, Van der Hoeven's Tijdsch. Naturg., p. 29, 1839; Temminck, Monogr. Mamm. 2, p. 289, 1841; Wagner, Abhandl. Münch. Akad., 5, p. 151, pl. 3, figs. 5 (head), 6–7 (wing sac) 1847; Reinhardt, Ann. Mag. Nat. Hist., (2), 3, p. 386, 1849 (descr. of wing sac); Burmeister, Thiere Brasil., Säugeth., p. 63, 1854.

*Saccopteryx canina* Dobson, Cat. Chiropt., p. 373, 1878; Alston, Biol. Cent.-Amer. Mamm., p. 29, 1879; Thomas, Ann. Mag. Nat. Hist., (7), 8, p. 140, 1900—British Guiana (Kanuku Mts.).

*Peropteryx canina* Peters, Monatsber. Akad. Wiss. Berlin, p. 472, 1867; J. A. Allen, Bull. Am. Mus. Nat. Hist., 13, p. 93, 1900—Colombia; Robinson and Lyon, Proc. U. S. Nat. Mus., 24, p. 159, 1901—Venezuela (meas., habits); J. A. Allen, Bull. Am. Mus. Nat. Hist., 20, p. 457, 1904—Colombia; G. M. Allen, Proc. Biol. Soc. Wash., 15, p. 95, 1902—Venezuela (descr., meas.); G. M. Allen, Bull. Mus. Comp. Zool., 52, p. 30, 1908—Venezuela; Brazil (skin meas.); J. A. Allen, Bull. Am. Mus. Nat. Hist., 30, p. 261, 1911—Venezuela (meas., habits); Cabrera, Trab. Mus. Nac. Cien.

Nat. Madrid, No. 11, p. 36, 1912; Miranda Ribeiro, Com. Linhas Teleg. Est. Matto Grosso ao Amazon, Anexo No. 5, p. 23, 1914—Brazil (Matto Grosso); Thomas, Proc. U. S. Nat. Mus., 58, p. 222, 1920—Peru; Thomas, Ann. Mag. Nat. Hist., (9), 6, p. 270, 1920—Brazil (Para); Goldman, Smiths. Misc. Coll., 59, p. 175, 1920—Panama (descr.); Murie, Univ. Mich., Mus. Zool., Misc. Pub., No. 26, p. 18, 1935—Guatemala (Petén).

*Type locality.*—Matto Grosso, Brazil.

*Distribution.*—From Guatemala south to Matto Grosso, Brazil, west to Peru and east to Sao Paulo, Brazil.

*Characters.*—Size small, greatest length of skull 12–15.

*Color.*—The color of the upper parts ranges from a dark buffy brown, through grayish brown and various shades of reddish brown, to a very dark blackish brown. The under parts are always slightly lighter. The majority of specimens are dark brown, and the color differences can not be correlated with geographic distribution.

*Measurements.*—Forearm, 38.3–48.2 (males 38.3–44.3, females 43.5–48.2). Skull: greatest length 12–15 (average of 79 skulls 14.1); condylo-basal length 10.7–13.7; palatal length 4.3–5.8; interorbital width 2.3–3.3; width of rostrum 5.3–6.9; zygomatic width 7.6–8.9; mastoid width 6.7–7.8; width of brain-case 5.9–7.1; upper tooth row 4.6–6.2; width across canines 3.2–4.1; width across molars 5.5–6.8.

External measurements of male and female topotypes from Matto Grosso, Brazil: tibia 18.3, 20; calcar 14.6, 13.6; forearm 41.8, 44.6; second digit metacarpal 34, 38.6; third digit metacarpal 36.7, 39.8, first phalanx 11.9, 12.8, second phalanx 18.4, 19.5; fourth digit metacarpal 32.4, 33.7, first phalanx 9.1, 9.1, second phalanx 8.5, 9.6; fifth digit metacarpal 32, 35.3, first phalanx 10.7, 11.9, second phalanx 7.1, 7.5.

*Specimens examined.*—187. GUATEMALA: Escobas, Izabal, 1 (F.M.); Patalul, Solola, 1 alc. (F.M.); Uaxactun, Petén, 19 (9 alc.) (U.M.). PANAMA: Balboa, 14 (10 alc.) (F.M.). COLOMBIA: Tahua-punto, Rio Waupes, 9 (A.M.); Bonda, 5 (A.M.). PERU: Puerto Indiana, 2 (A.M.); Orosa, 1 (A.M.); Lagarto, Rio Ucayali, 1 (A.M.); Matchu Picchu, 1 (N.M.). VENEZUELA: La Guaira, 13 (6 alc.) (N.M.); Robinson Crusoe's Cave, 5 alc. (M.C.Z.); Margarita Id., 2 (1 alc.) (M.C.Z.); San Esteban, 7 (5 A.M., 2 N.M.); Valera, 9 (7 alc.) (F.M.); Rio Cogollo, Perija, 8 (6 alc.) (F.M.); Esmarelda, Mt. Duida, 7 (A.M.). BRAZIL: Urucum, 8 (3 alc.), topotypes (F.M.); San Sebastian, Sao Paulo, 2 (N.M., F.M.); Ubatuba, Sao Paulo, 1 (N.M.); Lagoa Santa, Minas Geraes, 10 alc. (F.M.); Villa Nova, Bahia, 1 (N.M.); Sao Amarao, Bahia, 4 alc. (F.M.);

Quimadas, Bahia, 23 alc. (F.M.); Natal, Rio Grande de Norte, 5 alc. (N.M.); Arara, Piauh, 3 (F.M.); Alto Parnahyba, Maranhão, 4 (F.M.); Rio das Velhas, 1 alc. (M.C.Z.); Camanoas, Amazonas, 1 alc. (N.M.); Tauary, Rio Tapajoz, 4 (A.M.); Caiary-Uaupes, Rio Negro, 5 (A.M.); Tatu, Rio Negro, 2 (A.M.); Serra de Cucuhy Abajo, Rio Negro, 9 (A.M.).

### *Peropteryx macrotis trinitatis* Miller.

*Peropteryx trinitatis* Miller, Bull. Am. Mus. Nat. Hist., 12, p. 178, 1899.

*Saccopteryx canina* Thomas, Journ. Trinidad Field Nat. Club, 1, No. 7, p. 4 (author's separate), 1893; J. A. Allen, Bull. Am. Mus. Nat. Hist., 9, p. 14, 1897—(habits).

*Type locality*.—Trinidad.

*Type*. In American Museum of Natural History, New York.

*Distribution*.—Trinidad.

*Characters*.—Described as smaller than typical *macrotis*.

*Color*.—Dull sepia throughout, the hairs paler at base. Ears and membranes dark brown.

*Measurements*.—After Miller. External measurements of type: Total length, 60; tail vertebrae, 14.4; tibia, 18; foot, 6.4; calcar, 17; forearm, 41; thumb, 7; second finger, 34; third finger, 72; fourth finger, 49; fifth finger, 47; ear from meatus, 15; ear from crown, 12; width of ear, 11; tragus, 5. Average measurements of five specimens (2 ♂♂, 3 ♀♀) from the type locality: total length, 59 (57–60); tail vertebrae, 13.4 (13–14.4); tibia, 16.7 (16–18); foot, 6.3 (6–7); calcar, 15.4 (14–17); forearm, 40 (39–41); thumb, 6.5 (6–7); second finger, 32.6 (31–34); third finger, 69 (68–72); fourth finger, 48 (47–49); fifth finger, 46 (45–47); ear from meatus, 14 (13–15); ear from crown, 12.2 (12–13); width of ear, 11; tragus, 4.9 (4–5.4).

Cranial measurements of type: greatest length, 13.8; basal length, 12; basilar length, 10; greatest breadth of rostrum in front of orbits, 6; least breadth immediately in front of supraorbital processes, 2.6; tip to tip of supraorbital processes, 7; zygomatic breadth, 8; mastoid breadth, 7.4; greatest breadth of brain-case, 6.4; medium length of bony palate, 4; width of bony palate between posterior molars, 3.2; occipital depth, 5; depth of rostrum at base of second premolar, 1.8; upper tooth row (exclusive of incisors), 5.4; mandible, 9.4; mandibular tooth row (exclusive of incisors), 5.6.

*Specimens examined*.—3. TRINIDAD: Port of Spain, 3 alc. (A.M. 1, N.M.2).

*Remarks*.—See under next form.

***Peropteryx macrotis phaea* G. M. Allen.**

*Peropteryx canina phaea* G. M. Allen, Bull. Mus. Comp. Zool., 54, p. 222, 1911.

*Type locality*.—Point Saline, Grenada, West Indies.

*Type*. In Museum of Comparative Zoology, Cambridge, Massachusetts.

*Distribution*.—Grenada Island, West Indies.

*Characters*.—Averages smaller than *Peropteryx macrotis macrotis* of the mainland.



FIG. 43. Known distribution of ■ *Peropteryx macrotis macrotis*, ● *P. m. trinitatis* (Trinidad), and ▲ *P. m. phaea* (Grenada). ■ ● ▲ = specimens examined.

*Color*.—Above and below brown, ranging from a slightly reddish-brown to a blackish-brown.

*Measurements*.—Forearm 39–43.5 (average of 22 specimens 41.6). Skull: greatest length 12.6–13.7 (average of 22 specimens 13.5); condylo-basal length 11.4–12.3; palatal length 4.8–5.2; inter-orbital width 2.6–2.8; width of rostrum 5.7–6.1; zygomatic width 7.6–8.2; mastoid width 6.8–7.3; width of brain-case 6–6.6; upper tooth row 5–5.5; width across canines 3–3.7; width across molars 5.4–6.2.

*Specimens examined.*—46. BRITISH WEST INDIES: Mt. Pleasant Estate, Grenada, 25 (N.M.); Point Saline, 2 (F.M., M.C.Z.), 19 alc. (M.C.Z.).

*Remarks.*—This insular race averages smaller than the mainland form, and, in the series examined, the majority lack the reddish tone to the fur. Many mainland specimens, however, also lack the reddish tone. *Peropteryx macrotis trinitatis* appears to be about the same size, but there are not enough specimens available to determine this, nor any skins for a comparison of color. More material from Trinidad may show *trinitatis* to be the same as *macrotis*, or *phaea* to be the same as *trinitatis*, but the Grenada form is most likely to prove distinct.

### *Peropteryx kappleri* Peters.

*Peropteryx kappleri* Peters, Monatsber. Akad. Wiss. Berlin, p. 473, 1867; Dobson, Cat. Chiropt., p. 374, 1878; Lyon, Proc. U. S. Nat. Mus., 24, p. 159, 1901—Venezuela (desc., meas.); J. A. Allen, Bull. Am. Mus. Nat. Hist., 28, p. 147, 1910—Venezuela; *ibid.*, 30, p. 260, 1911—Venezuela (meas.; habits); Miller, Proc. Biol. Soc. Wash., 45, p. 149, 1932—Canal Zone, Panama (meas., habits); Enders, Bull. Mus. Comp. Zool., 78, p. 416, 1935—Canal Zone, Panama (habits); Sanborn, Field Mus. Nat. Hist., Zool. Ser., 20, p. 94, 1936—Guatemala (habits).

*Peropteryx canina* J. A. Allen (not Maximilian), Bull. Am. Mus. Nat. Hist., 24, p. 669, 1908—Nicaragua; *ibid.*, 28, p. 110, 1910 (pt.) Nicaragua.

*Peropteryx macrotis macrotis* G. M. Allen (not Wagner), Journ. Mamm., 16, p. 227, 1935 (ref. to specimens only)—Canal Zone, Panama.

*Type locality.*—Dutch Guiana.

*Distribution.*—From Guatemala south through Nicaragua and Panama to Ecuador, and east through Venezuela to Dutch Guiana.

*Characters.*—Like *Peropteryx m. macrotis* but larger throughout. Forearm 45–53.6 mm.; greatest length of skull 16–17.8 mm.

*Color.*—There are two color phases; one is close to mummy brown and the other is a little darker than Prout's brown. In both, the underparts are slightly lighter.

*Measurements.*—Forearm, males 45–51, females 47.9–53.6. Skull: greatest length 16–17.8; condylo-basal length 14.1–16.2; palatal length 6.3–7.1; interorbital width 2.6–3.5; width of rostrum 7.3–8.1; zygomatic width 9.5–10.9; mastoid width 8.1–9; width of brain-case 7.1–8; upper tooth row 6.8–7.8; width across canines 4.1–5.2; width across  $m^2$ – $m^2$ , 7–8.3.

External measurements of a male and female from Yasisa, Panama. Tibia 19.2, 20.2; calcar 17.4, 17.6; forearm 49.6, 53.6;

second digit metacarpal 42.4, 46.3; third digit metacarpal 45.3, 48.8, first phalanx 15, 15.8, second phalanx 20.8, 23.7; fourth digit metacarpal 38.2, 40.8, first phalanx 9.8, 10.6, second phalanx 9.5, 10.3; fifth digit metacarpal 36.1, 39.4, first phalanx 11.3, 12.2, second phalanx 7.8, 8.7.

*Specimens examined.*—93. GUATEMALA: Escobas, Izabal, 5 (F.M.). NICARAGUA: San Juan, 13 (A.M.); Muy Muy, 1 (A.M.); Lavalá, 1 (A.M.). PANAMA: Yasisa, 39 (22 M.C.Z., 17 U.M.). CANAL ZONE: 7 alc. (N.M.). VENEZUELA: San Julian, 15 (14 N.M.,



FIG. 44. Known distribution of *Peropteryx kappleri*. ■ = specimens examined. □ = published references.

1 A.M.); Aroa, Bolivar R. R., 3 (A.M.); Rio Mocho, Caura Dist., 1 (A.M.); Peru Mine, El Callao, 3 (A.M.); Rio Cogollo, Perija, 1 (F.M.). ECUADOR: Portovelo, Prov. del Oro, 4 (A.M.).

*Remarks.*—The members of the genus *Peropteryx* have often been reported from very shallow caves or from crevices between boulders where light can enter. They sometimes hang from a horizontal surface but often cling with outspread forearms and feet to a vertical surface.

Of many specimens of *macrotis* collected by the Olallas, but two are marked as having been taken from dead trees, the others having



been collected among boulders. Murie found them hanging from palm thatching at Uaxactun, Peten. *Peropteryx m. phaea* was found by Dr. G. M. Allen in "a rather open cave on the sea-cliffs" in Grenada.

On July 10 Lyon and Robinson collected two female *kappleri* at La Guaira, one with a young about to be born, the other with an already large young clinging about her neck. Murie took female *macrotis* with embryos and young between March 27 and April 11.

### Genus PERONYMUS Peters

*Peronymus* Peters, Monatsber. Akad. Wiss. Berlin, p. 145, 1868 (subgenus of *Peropteryx*).

*Peronymus* Miller, Bull. 57, U. S. Nat. Mus., p. 90, 1907.

*Characters*.—Wings beyond forearm white. Ears connected by low band of membrane across forehead. Wing sac as in *Peropteryx*. Skull as in *Peropteryx* but rostrum relatively broader. Basisphenoid pit deep, with two large lateral pterygoid pits at its anterior end.

### *Peronymus leucopterus leucopterus* Peters.

*Peropteryx leucoptera* Peters, Monatsber. Akad. Wiss. Berlin, p. 474, 1867.

*Peronymus leucopterus* Peters, Monatsber. Akad. Wiss. Berlin, p. 145, 1868 (subgenus of *Peropteryx*); Thomas, Ann. Mag. Nat. Hist., (9), 6, p. 270, 1920—Brazil (Cameta, Tocantins); Cott, Proc. Zool. Soc. Lond., p. 1174, 1926—Brazil (Catu, near Belem; habits).

*Saccopteryx leucoptera* Dobson, Cat. Chiropt., p. 374, 1878.

*Type locality*.—Dutch Guiana.

*Type*. In Berlin Museum.

*Distribution*.—Dutch Guiana, southern Venezuela, and the eastern Amazon basin of Brazil.

*Characters*.—Those of the genus.

*Color*.—Ranges from a uniform dark blackish brown to a dark reddish brown or dark brown. Slightly lighter on under surface.

*Measurements*.—Forearm, males, 41.1–44.6, females, 43.1–47. Skull: greatest length 14.5–15.6; condylo-basal length 13.1–14.1; palatal length 5.7–6.4; interorbital width 3.1–3.7; greatest width of rostrum 7.1–7.8; zygomatic width 9.6–10.2; mastoid width 7.5–8.3; width of brain-case 6.8–7.7; upper tooth row 6–6.6; width across canines 3.9–4.6; width across molars 6.8–7.5.

External measurements of one immature female in alcohol: forearm 44.4; second digit metacarpal 35; third digit metacarpal 37.6, first phalanx 11.1, second phalanx 20; fourth digit metacarpal

31.2, first phalanx 9, second phalanx 10.7; fifth digit metacarpal 31.8, first phalanx 11.1, second phalanx 7.8.

*Specimens examined.*—34. VENEZUELA: Buena Vista, Rio Casiquiare, 1 (A.M.). BRAZIL: Caxiricatuba, Rio Tapajoz, 7 (A.M.); Igarape Brabo, Rio Tapajoz, 3 (A.M.); Rio Tapajoz, 1 (A.M.); Rio Aramanay, Rio Tapajoz, 2 (A.M.); Tauary, Rio Tapajoz, 13 (1 alc.) (10 A.M., 3 M.C.Z.); Ilha do Taiuna, 6 (A.M.); Villarinho do Monte, Rio Xingu, 1 (A.M.).

*Remarks.*—Specimens examined were collected from March to June and in October and November. The collectors, the Olalla

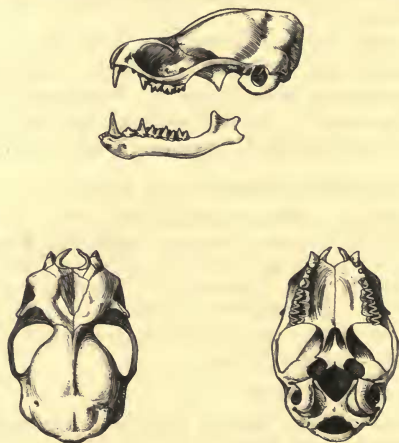


FIG. 45. Skull of *Peronymus leucopterus*. Twice natural size

brothers, have marked the labels "Tirado (shot); hueco arbol fresco (hole in green tree) or seco (dead tree)." Two taken, April 18 and June 2, are marked "prenada" (pregnant); one taken March 27, "prenada, 1 crio sin pelo" (pregnant, 1 young without hair) and one May 1, "dentro de un tronco podrido, suelo, bosque. Prenada, 1 crio con pelo" (in a rotten log on ground in woods. Pregnant, one young with hair). Cott (l.c.) says of specimens taken at Catu, near Belem: "Two specimens were obtained, both from overhanging sandy banks, where they were found sleeping during the day."

The white wings of this species easily separate it from other members of the family. In the skull, which is very like that of

*Peropteryx*, the large pterygoid pits on each side of the anterior end of the basisphenoid pit are an outstanding character.

***Peronymus leucopterus cyclops* Thomas.**

*Peronymus cyclops* Thomas, Ann. Mag. Nat. Hist., (9), 13, p. 531, 1924.

*Type locality*.—Tushemo, near Masisea, Ucayali River, Peru.

*Type*.—In British Museum, No. 24. 3. 1. 6. Collected by Latham Rutter, Oct. 3, 1923.

*Distribution*.—Known only from type locality.

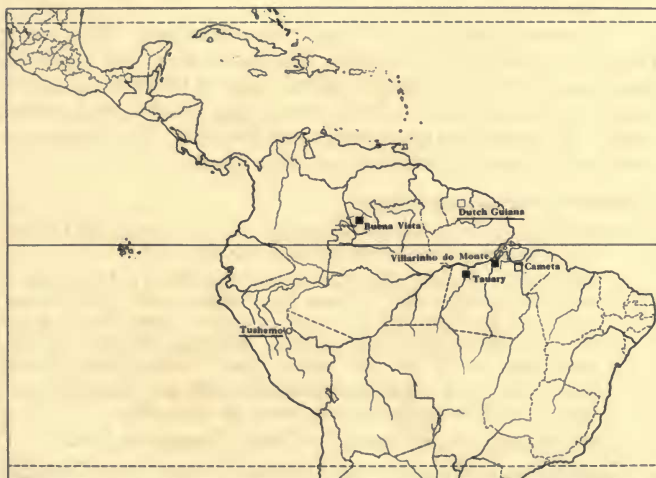


FIG. 46. Known distribution of ■ *Peronymus leucopterus leucopterus* and ○ *P. l. cyclops*. ■—specimens examined. □ ○—published references.

*Characters*.—Described as like *P. leucopterus* externally “though the head is rather more olive-coloured than the back, instead of being the same uniform brown, and the interfemoral membrane is rather less hairy.” Skull larger.

*Measurements*.—“Forearm 45. Head and body 50; tail 15; ear 17; third finger, metacarpus 40; lower leg and hind foot 24. Skull: greatest length to front of canine 16.2; condyle to front of canine 14.5; breadth of muzzle 8; interorbital breadth 3.2; breadth of brain-case 7.8; mastoid breadth 9.2; maxillary tooth row 6.5.”

*Specimens examined*.—None.

*Remarks.*—This slightly larger subspecies from Tushemo, Peru is known from but one specimen. Geographically it is widely separated from the known range of the species in eastern Brazil. Most of the specimens examined came from four localities on the Rio Tapajoz, all close to Tauary. It is very probable that more specimens from Peru will show that the type of *cyclops* is but a large individual which was described because of its geographic position.

### Genus CORMURA Peters

*Cormura* Peters, Monatsber. Akad. Wiss. Berlin, p. 475, plate opposite p. 482, 1867.

*Characters.*—Feet short. Wings from metatarsus. Wing sac in center of antebrachial membrane opening outward and extending from anterior border almost to elbow. Base of interfemoral almost naked. Skull with short, broad rostrum; rims of orbits and zygoma broad. No angle between rostrum and forehead. First upper pre-molar with distinct anterior and posterior cusps.

#### *Cormura brevirostris* Wagner.

*Emballonura brevirostris* Wagner, Weigmann's Arch. f. Naturg., (9), 1, p. 367, 1843; Wagner, Abhandl. Münch. Akad., 5, p. 187, 1847.

*Cormura brevirostris* Peters, Monatsber. Akad. Wiss. Berlin, p. 425, pl. opp. p. 482, 1867 (descr., meas.); Dobson, Cat. Chiropt., p. 375, 1878; Thomas, Ann. Mag. Nat. Hist., (8), 11, p. 133, 1913—Peru; Brazil (Para); Miller, U. S. Nat. Mus., Bull. 128, p. 38, 1924—Nicaragua; Sanborn, Ann. Carnegie Mus., 21, p. 172, 1932—Costa Rica; Colombia (Santa Marta).

*Peropteryx canina* J. A. Allen, (not Maximilian) Bull. Am. Mus. Nat. Hist., 28, p. 110, 1910—Nicaragua (Pena Blanca specimens only).

*Type locality.*—Marabitanas, Rio Negro, Amazonas, Brazil.

*Distribution.*—Nicaragua south through Ecuador and Colombia to Peru, and east through Venezuela and northern Brazil.

*Characters.*—Those of the genus.

*Color.*—There are two color phases, one a deep blackish brown and the other a reddish brown. In both, the underparts are paler. Two male specimens from Costa Rica, collected together, respectively represent both color phases.

*Measurements.*—Forearm 43.3–49.8. Skull: greatest length 15–16.7; condylo-basal length 13.6–15.7; palatal length 6.2–7.3; inter-temporal width 2.8–3.5; width of rostrum 5.8–6.6; zygomatic width 9.4–10.1; mastoid width 8.5–9.1; width of brain-case 7.2–8.3; upper tooth row 6.1–6.8; width across canines 3.6–4.3; width across  $m^1$ – $m^1$ , 6.6–7.9. Wing measurements of a female in alcohol, from Nicaragua.

Forearm 47.8; tibia 17; second digit metacarpal 39.9; third digit metacarpal 43.2, first phalanx 13.2, second phalanx 22.3; fourth digit metacarpal 35.8, first phalanx 10.3, second phalanx 8; fifth digit metacarpal 33.6, first phalanx 11.5, second phalanx 6.8.

*Specimens examined.*—32. NICARAGUA: Prinzapolka, 1 alc. (N.M.); Pena Blanca, 2 (A.M.). COSTA RICA: El Pozo de Terraba, 2 (C.M.); Talamanca, Rio Sicsola, 3 (A.M.). PANAMA: Capeti, 1 (A.M.). COLOMBIA: Don Diego, Santa Marta, 1 (C.M.). ECUADOR: Rio Capihuari, 2 (F.M.). PERU: Tingo Maria, Rio Huallaga, 1 alc.



FIG. 47. Known distribution of the genera ■ *Cormura* and ○ *Myropteryx*. ■ = specimens examined. □ ○ = published references.

(F.M.); Rio Amazonas, Puerto Indiana, 1, Orosa 3 (A.M.). VENEZUELA: Valle de los Monos, Mt. Duida, 3 (A.M.), Middle Camp, 1 (A.M.); Boca del Rio Ocama, Rio Orinoco, 2 (A.M.). BRAZIL: Tahuapunta, Rio Waupes, 3 (A.M.); Aramanay, Rio Tapajoz, 2 (A.M.); Auará Igarape, Rio Madeira, 2 (A.M.); Miripinima, Rio Negro, 1 (A.M.); Tatu, Rio Negro, 1 (A.M.).

*Remarks.*—In the shape of the first upper premolar ( $pm^2$ ) and the attachment of the wings to the metatarsus, *Cormura* agrees with *Centronycteris*. Upper premolars of the same shape are found in *Colura afra* of Africa and in the Taphozous group. In all other

genera of the family, except *Rhynchiscus* in which this tooth is flattened and not round,  $pm^2$  is a structureless spicule.

A male skin from Ecuador, in which the antebrachial membrane was relaxed, and a female in alcohol from Peru, show the wing sac in the same position as in the genus *Peropteryx*, but extending farther down the membrane and almost touching the elbow. The sac is little more developed in the male than in the female but much less developed than in the genus *Peropteryx*.

In most of the skulls the upper incisors have been lost, probably in handling, but in one there are two normal-sized teeth on one side. Two incisors were reported by Miller in a skull of *Myropteryx*.

The shape of the posterior palate has been considered a character of the genus, but in the skulls examined this is found to be so variable that it has no value.

#### Genus MYROPTERYX Miller

*Myropteryx* Miller, Proc. Biol. Soc. Wash., 19, p. 59, 1906. Dutch Guiana.

Type *Myropteryx pullus* Miller.

*Characters*.—Like *Cormura* but upper molars without hypocones, and upper incisors minute and early deciduous. Wing sac described as same as in *Peropteryx*.

#### *Myropteryx pullus* Miller.

*Myropteryx pullus* Miller, Proc. Biol. Soc. Wash., 19, p. 60, May 1, 1906.

—Dutch Guiana; Miller, U. S. Nat. Mus., Bull. No. 57, p. 91, 1907;

Thomas, Ann. Mag. Nat. Hist., (8), 11, p. 133, 1913.

*Type locality*.—Dutch Guiana.

*Type*.—In Berlin Museum.

*Distribution*.—Dutch Guiana and Matto Grosso, Brazil.

*Characters*.—Those of the genus.

*Color*.—"When dried, mummy brown above, cinnamon, tinged with drab below, the hairs everywhere becoming lighter at extreme base, and those of back faintly darker at tip."

*Measurements*.—"Type: (adult male from type locality in parenthesis). Total length 67 (61); tail 12 (13); tibia, 16 (16); foot 6.8 (7); forearm, 43.6 (45); thumb, 9 (9); second finger, 37.6 (37); third finger, 76 (75); fourth finger, 52 (51); fifth finger, 51 (49); ear, from meatus, 14.4 (14); ear, from crown, 11.4 (11); width of ear, 10.4 (10.4)."

*Specimens examined*.—None.

*Remarks*.—Thomas examined the specimens on which this genus was based and came to the conclusion that it was not separable from *Cormura*. He stated that the hypocones on the upper molars, while

low, were present. He did suggest that there might be some character in the shape of the posterior palate, but this is so variable, as seen in *Cormura*, that it would be of very little value. Dr. W. H. Osgood, who compared the Field Museum skull from Peru with specimens in the British Museum, states in his notes that the species *pullus* may stand, as specimens from Para have relatively narrow skulls.

The shape of  $pm^2$ , the point of attachment of the wings, the amount of fur at the base of the interfemoral, and the exact shape and size of the wing sac are points still to be checked in *Myropteryx*.

### Genus BALANTIOPTERYX Peters

*Balantiopteryx* Peters, Monatsber. Akad. Wiss. Berlin, p. 476, 1867. Type *Balantiopteryx plicata* Peters.

*Characters*.—Wing sac near center of antebrachial membrane opening inward. Rostrum greatly inflated. Basisphenoid pit not divided by plate. Size small.

#### Balantiopteryx plicata Peters.

*Balantiopteryx plicata* Peters, Monatsber. Akad. Wiss. Berlin, p. 476, 1867; Elliot, Field Mus. Nat. Hist., Zool. Ser., 3, p. 149, 1903—State of Morelos, Mexico; J. A. Allen, Bull. Am. Mus. Nat. Hist., 22, p. 235, 1906—State of Sinaloa, Mexico.

*Saccopteryx plicata* Dobson, Cat. Chiropt., p. 376, 1878—Costa Rica; Alston, Biol. Cent.-Amer., Mamm. p. 29, pl. 3, fig. 4, 1879—Mexico; Costa Rica; J. A. Allen, Bull. Am. Mus. Nat. Hist., 3, p. 178, 1890—Oaxaca.

*Type locality*.—Punta Arenas, Costa Rica.

*Type*.—In British Museum.

*Distribution*.—From Sonora and southern Lower California to Costa Rica.

*Characters*.—Size large. Interpterygoid fossa narrow.

*Color*.—Dark gray above; below, dark gray on throat and chest becoming lighter on the lower abdomen.

*Measurements*.—Forearm, males 39–44.7, females, 38.3–46.2. Tibia 16.9–20.2. Skull: greatest length (from front of canine) 13–14.8; condylo-basal length (from in front of canine) 11.4–12.7; intertemporal width 2.8–3.7; width of rostrum 6.3–7; zygomatic width 8.3–9.3; mastoid width 7.4–8.2; width of brain-case 6.4–7.1; upper tooth row 5–5.6; width across canines 3.1–3.7; across molars 5.8–6.7.

External measurements of two males: forearm 42.7–44.7; second digit metacarpal 35.4–35.7; third digit metacarpal 37.8–37.8, first phalanx 10.6–11.5, second phalanx 11.9–15.5; fourth digit meta-

carpal 31.3–31.3, first phalanx 9.3–8.9, second phalanx 7.1–6.6; fifth digit metacarpal 29.3–29.7, first phalanx 9.5–9.5, second phalanx 5.7–5.7; tibia 18.4–18.

*Specimens examined*.—223. MEXICO: Camoa, Rio Mayo, Sonora, 1 alc. (N.M.); Rosario, Sinaloa, 3 alc. (N.M.); Mazatlan, Sinaloa, 2 alc. (N.M.); San Jose del Cabo, L. C., 1 (F.M.); Santa Anita, L. C., 4 (N.M.); San Blas, Nayarit, 14 (11 alc.) (N.M.); Colima, Colima, 2 alc. (N.M.); Cuyutlan, Colima, 7 alc. (N.M.); Mazanillo, Colima, 51 alc. (N.M.); La Salada, Michoacan, 2 (1 alc.) (N.M.); Acapulco, Guerrero, 9 (7 alc.) (N.M.); Cuernavaca, Morelos, 35 (29 alc.) (N.M.); Puente de Ixtla, Morelos, 1 (F.M.); Tehuantepec, Oaxaca, 5 (N.M.), 20 alc. (8 A.M., 12 N.M.); Tapanatepec, Oaxaca, 2 (M.C.Z.); San Geronimo, Oaxaca, 5 (F.M.), 54 alc. (46 F.M., 6 N.M., 2 M.C.Z.); Santa Efigenia, Oaxaca, 1 alc. (N.M.); Cuicatlan, Oaxaca, 1 alc. (N.M.); San Bartolome, Chiapas, 1 (N.M.). GUATEMALA: El Rancho, Zacapa, 2 alc. (N.M.).

*Remarks*.—This form appears to be common on the west coast of Mexico and much less common from Guatemala south to Costa Rica, as there is only one record each for these two countries. Aside from its inhabiting caves little is known of its habits. The majority of the Mexican specimens examined were collected by Nelson and Goldman between 1892 and 1906.

### *Balantiopteryx io* Thomas.

*Balantiopteryx io* Thomas, Ann. Mag. Nat. Hist., (7), 13, p. 252, 1904; Goodwin, Bull. Am. Mus. Nat. Hist., 68, p. 7, 1934—Alta Verapaz, Guatemala (descr., skin meas., habits); Sanborn, Field Mus. Nat. Hist., Zool. Ser., 20, p. 95, 1936—Izabal, Guatemala (meas.).

*Type locality*.—Rio Dolores, near Coban, Alta Verapaz, Guatemala.

*Type*.—In British Museum, no. 86. 9. 3. 1. Collected by F. C. Sarg.

*Distribution*.—Alta Verapaz and Izabal, Guatemala.

*Characters*.—Size small. Interpterygoid fossa broadly U-shaped.

*Color*.—Dark brown above, lighter below. One specimen is lighter and three are blackish brown.

*Measurements*.—Forearm 35.6–38.8. Tibia 14–15.9. Skull: greatest length (from front of canine) 12.4–12.9; condylo-basal length (from in front of canine) 10.9–11.2; intertemporal width 3.1–3.5; width of rostrum 5.7–6.2; zygomatic width 8.2–8.3; mastoid width 7.5–7.8; width of brain-case 6.4–6.8; upper tooth row 4.5–4.8; width across canines 3.–3.3; width across molars 5.5–5.9.



External measurements of a male: forearm 38.1; tibia 15.5; second digit metacarpal 32.5; third digit metacarpal 35.5, first phalanx 11.3, second phalanx 14.2; fourth digit metacarpal 28.8, first phalanx 8.6, second phalanx 5.5; fifth digit metacarpal 26.6, first phalanx 9.5, second phalanx 4.6.

*Specimens examined*.—21. GUATEMALA: Escobas, near San Tomas, Izabal, 12 (10 F.M., 2 M.C.Z.), 5 alc., 4 skeletons.

*Remarks*.—Some specimens of *B. io* are as large as small specimens of *B. plicata* in certain measurements, but *io* is always shorter in



FIG. 48. Known distribution of ■ and numerals *Balantiopteryx plicata*, ● *B. io*, and △ *B. infusca*. Numerals and ■ ● = specimens examined. □ ○ = published references.

skull length and in the length of the upper tooth row and tibia. The interpterygoid fossa is broadly U-shaped in *io* and quite narrow in *plicata*. From known specimens *io* is found only in eastern Guatemala while *plicata* inhabits the Pacific coast or, with the exception of one specimen from Guatemala, close to it.

### *Balantiopteryx infusca* Thomas.

*Saccopteryx infusca* Thomas, Ann. Mag. Nat. Hist., (6), 20, p. 546, 1897.

*Balantiopteryx infusca* Miller, U. S. Nat. Mus., Bull. 57, p. 93, 1907.

*Type locality*.—Cachavi, North Ecuador.

*Type*.—In British Museum. Received from W. F. H. Rosenberg.

*Distribution*.—Known only from type locality.

*Characters*.—“Similar in all essential respects to *S. (Balaniopteryx) plicata*, Pet., but rather smaller and less thickly built, much darker in colour, with decidedly narrower ears, less hairy interfemoral, and no white line along the posterior edge of the wing-membrane.”

“Ears narrow, inner margin faintly concave in its upper half; tip narrowly rounded off; outer margin straight above, slightly convex below. Interfemoral very thinly haired as far as the exsertion of the tail.”

“Colour (from a skin) dark chestnut-brown above, scarcely paler below. *S. plicata* is slaty grey.”

*Measurements*.—“Forearm 41 millim. Head and body 42; tail 13; tail free from membrane 2.7; ear 11.3; tragus on inner edge 3.3; lower leg 16; calcar 14.”

*Specimens examined*.—None.

*Remarks*.—The only mention of the skull of *infusca* is found in the description of *io*, where Thomas states that the skull of *io* is as large as that of *infusca*.

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